

UNI-T®

UT82系列 使用手册 UT82 Series Operating Manual



示波型数字万用表

Oscilloscope digital multimeter

1. 安全信息	1
安全术语和符号	1
安全要求	1
2. 如何进行一般性检查	5
3. 使用示波器	6
示波器的结构	6
示波器的用户界面介绍	9
如何进行功能检查	10
如何进行探头补偿	11
如何进行探头衰减系数设定	12
如何安全使用探头	13
垂直系统	15
水平系统	15
测量系统	16
使用自动设置显示不明信号	20
触发系统	20
如何进行保存设置	21
如何进行系统设置	23
4. 使用万用表	25
关于本章	25
仪表界面	25
5. 使用信号发生器（仅 UT82B/UT82D/UT82F）	27
连接输出端	27
设置波形	27
设置负载	27
输出正弦波	29
输出矩形波	29
输出锯齿波	29
输出脉冲波	30

输出任意波	30
6. 与计算机上位机软件通讯	32
7. 故障处理	33
8. 技术规格	34
示波器	34
万用表	35
信号发生器（仅 UT82B/UT82D/UT82F）	37
一般技术规格	37
9. 附录	39
附录 A：装箱清单	39
附录 B：保养和清洁维护	39

1. SAFETY TERMS AND SYMBOLS	42
SAFETY TERMS	42
SAFETY SYMBOLS	42
SAFETY REQUIREMENTS	42
2. HOW TO IMPLEMENT THE GENERAL INSPECTION	46
3. HOW TO USE THE OSCILLOSCOPE	47
THE STRUCTURE OF THE OSCILLOSCOPE	47
INTRODUCTION TO THE USER INTERFACE OF THE OSCILLOSCOPE	50
FUNCTIONAL CHECK	51
PROBE COMPENSATION	53
PROBE ATTENUATION COEFFICIENT SETTING	54
SAFE USE OF PROBE	54
VERTICAL SYSTEM	56
HORIZONTAL SYSTEM	57
MEASURING SYSTEM	58
DISPLAY UNKNOWN SIGNALS USING AUTOMATIC SETTINGS	61
TRIGGER SYSTEM	61
SAVE SETTINGS	63
SYSTEM SETTINGS	64
4. HOW TO USE THE MULTIMETER	67
ABOUT THIS CHAPTER	67
INSTRUMENT INTERFACE	67
5. HOW TO USE THE WAVEFORM GENERATOR (ONLY UT82B/UT82D/UT82F)	69
CONNECT THE OUTPUT	69
SET THE WAVEFORM	69
6. COMMUNICATION WITH PC	74
7. TROUBLESHOOTING	75

Table of Contents

8. TECHNICAL SPECIFICATIONS	77
OSCILLOSCOPE	77
MULTIMETER	80
ARBITRARY WAVEFORM GENERATOR(ONLY UT82B/UT82D/UT82F)	81
GENERAL TECHNICAL SPECIFICATIONS	82
9. APPENDIX	84
APPENDIX A: LIST OF ACCESSORIES	84
APPENDIX B: MAINTENANCE AND CLEANING	84

1. 安全信息

(在使用该产品前，请务必事先阅读安全信息)

安全术语和符号

本手册中的术语

以下术语可能出现在本手册中：

 **警告：**警告性声明，指出可能会危害生命安全的条件和行为。

 **注意：**注意性声明，指出可能导致此产品和其它财产损坏的条件和行为。

产品上的术语

以下术语可能出现在产品上：

危险：表示您读取此标记时可能会立即对您造成损害。

警告：表示您读取此标记时可能不会立即对您造成损害。

注意：表示可能会对本产品或其他财产造成损害。

产品上的符号

以下符号可能出现在产品上：

高电压 注意请参阅手册 保护性接地端 壳体接地端 测量接地端



安全要求

请阅读下列安全注意事项，以避免人身伤害，并防止本产品或与其相连接的任何其他产品受到损坏。为了避免可能发生的危险，本产品只可在规定的范围内使用。



警告：

为防止触电或失火，请使用适当的电源适配器。只可使用本产品专用，并且核准可用于该使用国的电源适配器。



警告：

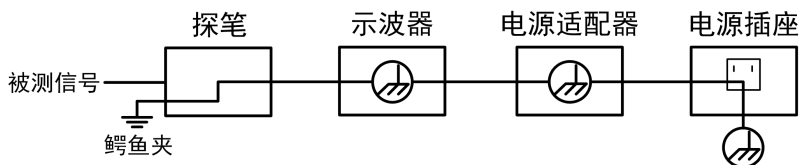
示波器两个通道是非隔离通道。注意测量时通道要采用公共基准，两个探头的地线不可以接到两个非隔离的不同直流电平的地方，否则可能因为示波器探头的地线连接引起短路。



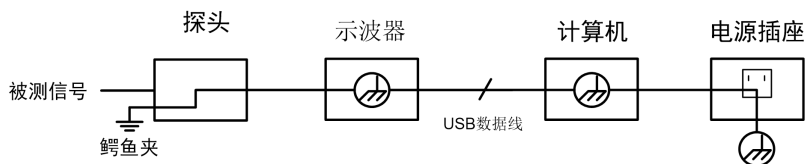
警告：

注意测量时通道要采用公共基准，否则可能因为示波器探笔的地线连接引起短路。

示波器内部地线连接示意图：



示波器通过端口与计算机连接时的内部地线连接示意图：



在示波器通过适配器交流供电，或者示波器通过端口与交流供电的计算机连接

的情况下，不可以测量电网一次侧电源。

 警告：

如果示波器输入端口连接在峰值高于 42V 的（30 V_{rms}） 的电压或超过 4800 VA 的电路，为避免触电或失火：

- 只使用示波器附带的并有适当绝缘的电压探针、测试导线和适配器，或由本公司指明适用于示波器仪表系列产品的配件。
- 使用前，检查万用表测试笔、示波器探极和附件是否有机械损伤，如果发现损伤，请更换。
- 拆去所有不使用的测试笔、探极和附件（电源适配器、USB 等）。
- 先将电源适配器插入交流电插座，然后再将其连接到示波器上。
- 在 CAT II 环境中测试时，不要将高于地表 400 V 以上的电压连接到任何输入端口。
- 在 CAT II 环境中测试时，不要将电压差高于 400 V 的电压连接到隔离的输入端口。
- 不要使用高于仪器额定值的输入电压。在使用 1:1 测试导线时要特别注意，因为探头电压会直接传递到示波器上。
- 不要接触裸露的金属 BNC 或香蕉插头。
- 不要将金属物体插入接头。
- 仅以指定的方式使用示波器。
- 在“警告”信息中提到的电压额定值是“工作电压”的限定值。它们表示交流正弦波应用时的 V_{ac rms} (50–60 Hz)；直流应用时的 V_{dc}。CAT 是前缀，II 是指级别，II 级是低压高能量级别，是指适用于电器和便携式设备的局部电平。
- 信号源输出口（GEN Out）不能输入任何信号、电压、电流等电气。

只有合格的技术人员才可进行维修。

注意所有终端的额定值：为了防止火灾或电击危险，请注意本产品的所有额定值和标记。在对本产品进行连接之前，请阅读本产品用户手册，以便进一步了解有关额定值的信息。

请勿在无仪器盖板时操作：如盖板或面板已卸下，请勿操作本产品。

避免接触裸露电路：产品有电时，请勿触摸裸露的接点和部件。

在有可疑的故障时，请勿操作：如怀疑本产品有损坏，请让合格的维修人员进行检查。

请勿在潮湿的环境下操作。

请勿在易爆环境中操作。

保持产品表面清洁和干燥。

不按制造厂规定的方法来使用设备，可能会损坏设备所提供的防护。

2. 如何进行一般性检查

当您得到一台新的示波器时，建议您按以下步骤对仪器进行检查。

检查是否存在因运输造成的损坏

如果发现包装纸箱或泡沫塑料保护垫严重破损，请先保留，直到整机和附件通过电性和机械性测试。

检查附件

关于提供的附件明细，在本说明书“附录A：附件”已经进行了说明。您可以参照此说明检查附件是否有缺失。如果发现附件缺少或损坏，请和负责此业务的本公司经销商或本公司的当地办事处联系。

检查整机

如果发现仪器外观破损，仪器工作不正常，或未能通过性能测试，请和负责此业务的本公司经销商或本公司的当地办事处联系。如果因运输造成仪器的损坏，请注意保留包装。通知运输部门和负责此业务的本公司经销商。本公司会安排维修或更换。

3. 使用示波器

示波器的结构

前面板和按键

示波器的前面板和按键见下图：

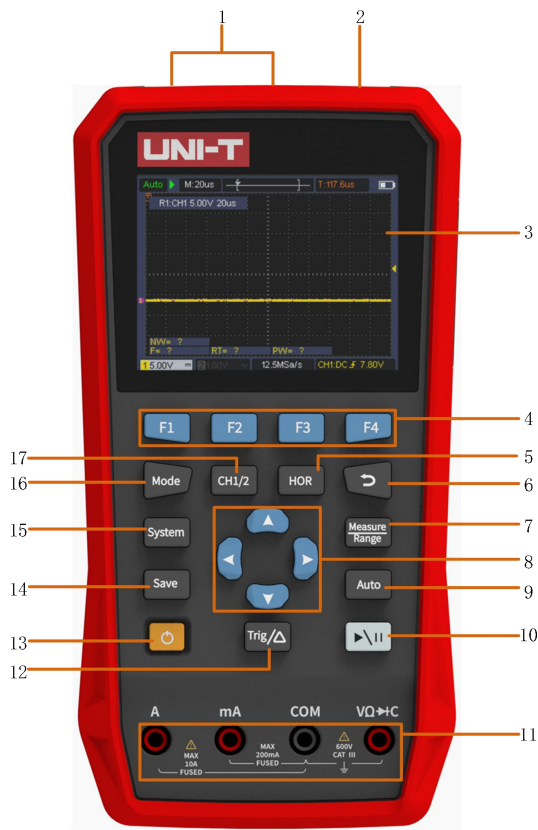


图 3- 1：示波器前面板

说明:

1. CH1、CH2被测信号输入连接器。
2. 信号发生器输出连接器（选配）。
3. 显示区域。
4. 按 **F1~F4** 键，多功能按键，在每个菜单模式下，按下相应的按键可以选择对应的菜单项。
5. 按 **HOR** 键，通过 ▲ ▼ 按键，可以改变水平时基设置，并观察因此导致的状态信息变化，也可以发现状态栏对应的 水平时基 显示发生了相应的变化；通过 ◀ ▶ 按键，可以调整信号在波形窗口的水平位移。
6. 返回按键，返回到上一级菜单，当菜单为第一级时，再按返回键关闭菜单。
7. 测量菜单按键（示波器）或 量程按键（万用表）。
8. 缩放或移动按键：
按 ▲ ▼ 方向键：示波器中用于上下移动波形、改变时基、移动电压光标及改变触发电平；
按 ◀ ▶ 方向键：示波器中用于左右移动波形、改变电压档位、移动时间光标。
9. 自动设置按键（示波器）或 自动量程按键（万用表）。
10. 停止/运行按键（示波器）或 **Hold**保持按键（万用表）或输出/关闭信号按键（信号发生器—选配）。
11. 万用表输入端。
12. 触发菜单按键（示波器）或 相对值按键（万用表）。

- 13. : 电源开关按键。
- 14. 进入保存设置按键。
- 15. 进入系统设置按键。
- 16. 示波器和万用表工作状态切换按键。
- 17. CH1/CH2通道切换按键。

侧面板



图 3- 2：示波器侧面板

说明：

- 1. 探头补偿：3.3V/1kHz方波信号输出。
- 2. 充电或USB通讯接口。
- 3. 支架。

示波器的用户界面介绍

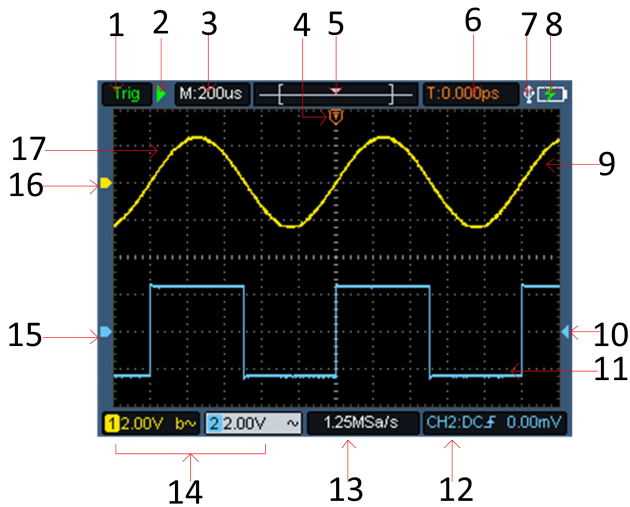


图 3- 3：示波器界面

说明：

- 1. 触发状态指示下列信息：
 - Auto：示波器处于自动方式并正采集无触发状态下波形。
 - Trig：示波器已检测到一个触发，正在采集触发后信息。
 - Ready：所有预触发数据均已被获取，示波器已准备就绪。
 - Scan：示波器以扫描方式连续地采集并显示波形数据。
 - Stop：示波器已停止采集波形数据。
- 2. 运行/停止。
- 3. 时基显示。
- 4. 指针表示触发水平位置。
- 5. 指针指示当前存储深度内的触发位置。

6. 指示当前触发水平位移的值，显示当前波形窗口在内存中的位置。
7. 表示当前有USB数据线插入。
8. 电池电量及外部供电指示。
9. 通道1的波形。
10. 指针表示通道触发电平位置。
11. 通道2的波形。
12. 图标表示触发的相关信息，包括触发通道、耦合方式、触发类型及触发电平，详见P20触发系统。
13. 当前采样率。
14. 通道信息读数表示相应通道的电压挡位。

图标指示通道的耦合方式：

“—”表示直流耦合；

“ ”表示交流耦合；

“”表示接地耦合。

15. 指针表示CH2通道所显示波形的接地基准点（零点位置）。如果没有标明通道的指针，说明该通道没有打开。
16. 指针表示CH1通道所显示波形的接地基准点（零点位置）。如果没有标明通道的指针，说明该通道没有打开。
17. 波形显示区。

如何进行功能检查

做一次快速功能检查，以核实本仪器运行正常。请按如下步骤进行：

1. 按下主机左下方的开关键 .

机内继电器将发出轻微的咔嚓声。仪器执行所有自检项目，出现开机画面。按下前面板按键 **System**，默认的探头菜单衰减系数设定值为 **10X**。

2. 示波器探头上的开关设定为 **10X**，并将示波器探头与 **CH1** 通道连接。

将探头上的插槽对准 **CH1** 连接器同轴电缆插接件(BNC)上的插头并插入，然后向右旋转并拧紧探头。

把探头端部和接地夹接到探头补偿器的连接器上，请注意端子极性，方形端子代表信号输出，圆形端子表示参考地。

3. 按前面板“Auto”按键。

几秒钟内，可见到方波显示 (1kHz/3.3Vpp)，见图 3- 4。

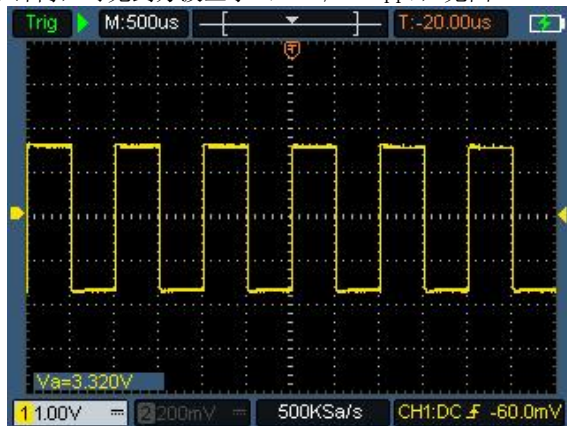


图 3- 4: 自动设置

重复步骤 2 和步骤 3 在 CH2 通道上测试一遍。

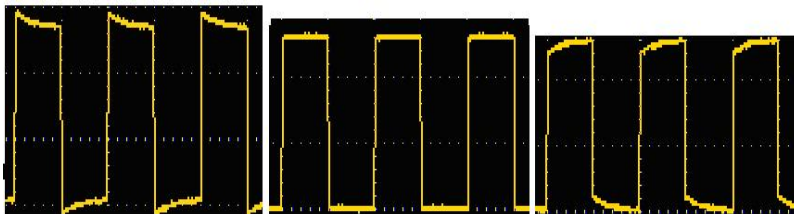
如何进行探头补偿

在首次将探头与任一输入通道连接时，进行此项调节，使探头与输入通道相配。未经补偿或补偿偏差的探头会导致测量误差或错误。若调整探头补偿，请按如下步骤：

- 1、 将探头菜单衰减系数设定为 **10X**，将探头上的开关设定为 **10X**（参见P12 的“如何进行探头衰减系数设定”），并将示波器探头与CH1通道连接。如使用探头钩形头，应确保与探头接触紧密。将探头端部与探头补偿器的信号输出连接器相连，基准导线夹与探头补偿器的地线连接器相连，

然后按 **Auto** 前面板按键。

- 2、 检查所显示的波形，调节探头，直到补偿正确。见图 3- 5，图 3- 6。



补偿过度

补偿正确

补偿不足

图 3- 5: 探头补偿显示波形

- 3、 必要时，重复步骤。

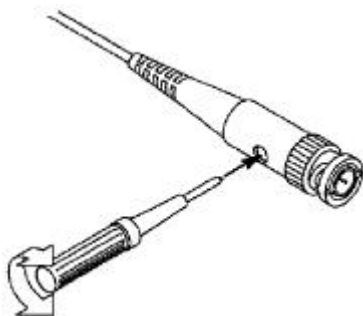


图 3- 6: 探头调整

如何进行探头衰减系数设定

探头有多种衰减系数，它们会影响示波器垂直档位因数。

如要改变（检查）示波器菜单中探头衰减系数设定值，请按如下步骤：

- (1) 按 **CH1/CH2** 键切换选择所使用的通道。
- (2) 按下 **F3** 键，选择所需的衰减系数。该设定在再次改变前一直有效。



注意：示波器出厂时菜单中的探头衰减系数的预定设置为 10X。
需确认在探头上的衰减开关设定值与示波器菜单中的探头衰减系数选项相同。

探头开关的设定值为 **1X** 和 **10X**。见图 3- 7。

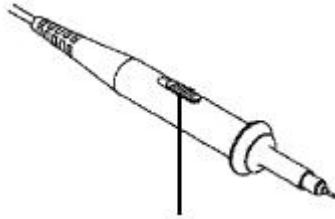


图 3- 7：探头衰减开关



注意：当衰减开关设定在 **1X** 时，探头将示波器的带宽限制在 **5 MHz**。
欲使用示波器的全带宽时，务必将开关设定为 **10X**。

如何安全使用探头

环绕探头体的安全环提供了一个手指不受电击的阻碍。见图 3- 8。

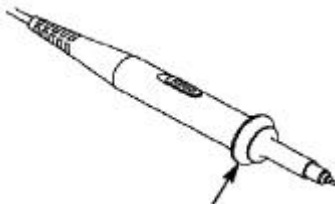


图 3- 8：探头手指安全环



警告：为了防止在使用探头时受到电击，请将手指保持在探头体上安全环的后面。
为了防止在使用探头时受到电击，在探头连接到电压源时不要接触探头头部的金属部分。
在做任何测量之前，请将探头连接到仪器并将接地终端连接到地面。

垂直系统

可使用垂直系统调整垂直刻度和位置及通道的其他设置。每个通道都有单独的垂直菜单，可以对每个通道进行单独设置。

垂直位置

按下 CH1/CH2 键选择通道，通过按 ▲ ▼ 方向键上下移动所选通道的垂直位置，同时按住两个方向键可以使垂直位置居中。

垂直伏/格设置

伏 / 格 范围是 10mV/div-10V/div （探 头 1X ），以 1-2-5 方式 步进， 或 100mV/div-100V/div （探 头 10X ）、 1V/div-1000V/div （探 头 100X ）、 10V/div-10000V/div （探 头 1000X ）、 100V/div-100000V/div （探 头 10000X ）。

按下 CH1/CH2 键选择通道，通过按 ◀ ▶ 方向键更改所选通道的伏/格设置。

垂直系统设置菜单说明如下表：

功能菜单	设定	说明
开关	开启 关闭	打开波形显示。 关闭波形显示。
耦合	直流 交流 接地	普通采样方式通过输入信号的交流和直流成分。 阻挡输入信号的直流成分。 断开输入信号。
探头	1X 10X 100X 1000X 10000X	根据探头衰减因数选取其中一个值，以保持垂直标尺读数准确。
带宽	20MHz 全带宽	限制带宽至 20MHz，以减少显示噪声。 示波器的带宽。

水平系统

按 HOR 键，进入水平系统设置菜单，使用◀ ▶方向键可改变水平刻度（时基）、水平触发位置。改变水平刻度时，波形相对于屏幕中心放大或缩小，水平位置改变时即相对于波形触发点的位置变化。

注：同时按住◀ ▶两个方向键可以使水平位置居中。

水管系统设置菜单说明如下表：

功能菜单	设定	说明
采集模式	采样	普通采样方式。
	峰值检测	用于检测干扰毛刺和减少混淆的可能性。
记录长度	4K 8K	选择要记录的长度。
XY模式	开启 关闭	选择开启或关闭XY模式。
1/2		进入下一页菜单。
刷新率	高 低	设置刷新率为“高”或“低”。
水平居中		水平触发位置设置在屏幕中间。
硬件频率	开启 关闭	开启/关闭硬件频率。
2/2		返回上一页菜单。

测量系统

自动测量

按  按键，按下 **F1** 键，可实现自动测量，屏幕左下方最多能显示9种测量类型。

≤100M机型自动量程类型包含：频率、周期、幅度、最大值、最小值、峰峰值、平均值。

200M机型自动量程类型包含：频率、周期、幅度、最大值、最小值、峰峰值、平均值、均方根值、上升时间、下降时间、正脉宽、负脉宽。

自动测量**功能菜单**说明如下表（以200M机型为例）：

功能菜单			说明
自动 测量	开启 关闭		开启或关闭自动测量。
	信源	CH1 CH2	设定信源。
	添加删除	频率 (F) ☐ 周期 (T) ☐ 幅度 (Va) ☐ 最小值 (Mi) ☐ 最大值 (Ma) ☐ 峰峰值 (Vpp) ☐ 平均值 (V) ☐ 均方根值 (RMS) ☐ 上升时间 (RT) ☐ 下降时间 (FT) ☐ 正脉宽 (PW) ☐ 负脉宽 (NW) ☐	添加或删除选中的测量类型（在左下角显示，最多9种）。 注：未选中状态为 ☐ ； 选中状态为 ☒ 。

电压参数的自动测量

示波器可以自动测量的电压参数包括平均值、峰峰值、均方根值、最大值、最小值、幅度。下图表述了一组电压参数的物理意义。

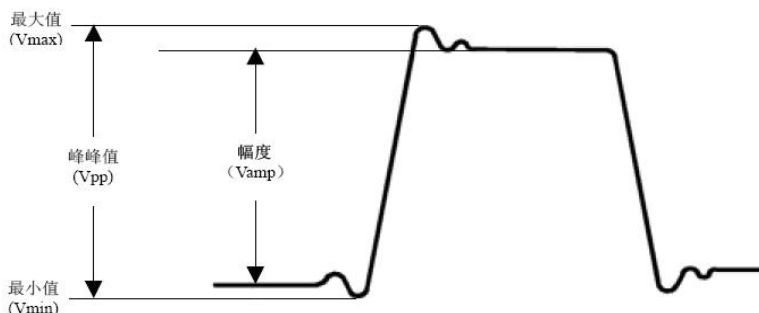


图 3- 9：电压参数定义示意（顶端平整有脉冲信号）

平均值 (Average)：整个波形或选通区域上的算术平均值。

峰峰值 (Vpp)：波形最高点波峰至最低点的电压值。

均方根值 (Vrms)：整个波形或选通区域上的精确“均方根”电压。

最大值 (Vmax)：波形最高点至 GND（地）的电压值。

最小值 (Vmin)：波形最低点至 GND（地）的电压值。

幅度 (Vamp)：波形顶端至底端的电压值。

时间参数的自动测量

示波器可以自动测量信号的周期、频率、上升时间、下降时间、正脉宽、负脉宽。

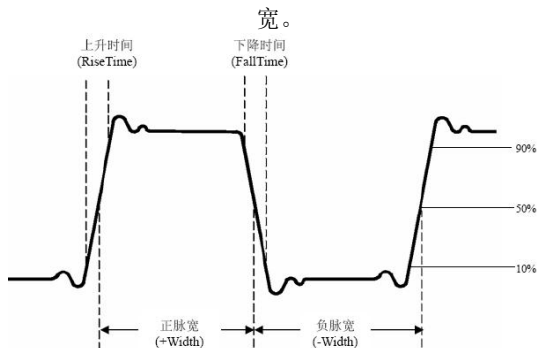


图 3-10：时间参数定义示意

上升时间 (RiseTime)：波形幅度从 10% 上升至 90% 所经历的时间。

下降时间 (FallTime)：波形幅度从 90% 下降至 10% 所经历的时间。

正脉宽 (+Width)：正脉冲在 50% 幅度时的脉冲宽度。

负脉宽 (-Width)：负脉冲在 50% 幅度时的脉冲宽度。

光标测量

按 **Measure Range** 按键，按下 **F2** 键，可实现光标测量。

光标测量菜单说明如下表：

功能菜单	设定	说明
类型	CH1 电压 CH2 电压 时间 无	选择显示 CH1 电压测量光标和菜单。 选择显示 CH2 电压测量光标和菜单。 选择显示时间测量光标和菜单。 关闭光标测量。
A		当类型选择 CH1 电压 或 CH2 电压 时，通过按▲ ▼方向键，移动A光标线；当类型选择 时间 时，通过按◀ ▶方向键，移动A光标线。
B		当类型选择 CH1 电压 或 CH2 电压 时，通过按▲ ▼方向键，

		移动B光标线；当类型选择 时间 时，通过按◀▶方向键，移动B光标线。
AB		链接A与B，当类型选择 CH1 或 CH2 时，通过按▲▼方向键，可同时移动两个光标；当类型选择 时间 时，通过按◀▶方向键，可同时移动两个光标。

使用自动设置显示不明信号

自动设置功能使示波器得以自动显示、测量不明信号。该功能可优化位置、量程、时基和触发，并确保任何波形的稳定显示。该功能在快速检查若干个信号时尤为有用。要启用自动设置功能，执行下列步骤：

1. 把示波器探头连接于被测信号。
2. 按 **Auto** 键，示波器进入自动测量状态，屏幕上会显示出被测信号。

触发系统

触发决定了示波器何时开始采集数据和显示波形。一旦触发被正确设定，它可以将不稳定的显示转换成有意义的波形。

示波器在开始采集数据时，先收集足够的数据用来在触发点的左方画出波形。示波器在等待触发条件发生的同时连续地采集数据。当检测到触发后，示波器连续地采集足够的数据以在触发点的右方画出波形。

本系列示波器的触发方式为边沿触发。

边沿触发方式是在输入信号边沿的触发电平上触发，即在输入信号的上升沿、下降沿触发。

进入边沿触发，屏幕右下角显示触发设置信息，如 **CH1:DC F -20.0mV**，表示触发类型为上升沿，触发信源为 CH1，触发耦合为 DC，触发电平为 -20.0mV。

触发系统设置菜单说明如下表：

功能菜单	设定	说明
信源	CH1	设置通道1 作为信源触发信号。
	CH2	设置通道2 作为信源触发信号。

耦合	交流 直流	设置阻止直流分量通过。 设置允许所有分量通过。
触发类型	自动 正常 单次	设置在没有检测到触发条件下也能采集波形。 设置只有满足触发条件时才能采集波形。 设置当检测到一次触发时采样一个波形，然后停止。
1/2		进入下一页菜单
斜率	上升沿 下降沿	设置在信号上升沿触发。 设置在信号下降沿触发。
触发居中		触发位置设置在波形中间位置。
强制触发		强制触发按键，强制产生一个触发信号，主要应用于触发方式中的“正常”和“单次”模式。
2/2		返回上一页菜单

触发电平：设置采集波形时信号所必须越过的幅值电平。按 Trig/△ 按键进入触发菜单，按 ▲ ▼ 按键来上下调节触发电平。

如何进行保存设置

按下 Save 按键，进入保存功能菜单，通过操作保存功能菜单，可存储示波器设置、参考波形、文件。

● 设置

任何设置可以被保存到示波器内部，也可调出恢复设置。

设置 菜单说明如下表：

功能菜单	设定	说明
目标	S1 S2 S3 S4	设置波形名称。
保存		保存示波器当前的参数设置到内部存储器。
调用		调用保存在当前存储位置的设置。

● 参考波形

可以把实际波形和参考波形进行比较，从而找出差异。按下 **Save** 按键，进入保存功能菜单，按 **F2** 选择 参考波形，进入参考波形菜单。

参考波形菜单说明如下表：

功能菜单	设定	说明
信源	CH1 CH2	选择需要保存的参考波形。
目标	R1 R2 R3 R4	设置波形名称。
显示	开启 关闭	调出或关闭内部存储器中当前目标地址的波形。当显示开启时，如当前地址已有存储波形，则显示波形，左上角显示地址编号及波形相关信息；如当前地址未被存储，则显示“地址编号：无保存波形”。
保存		把信源的参考波形存储到存储器中。

● **文件**

文件保存可以保存的类型为 波形或图像，波形及图像可以通过重新插拔 USB 数据线或在系统设置下一页 USB 选项选择为 MSC 来读取。

文件菜单说明如下表：

功能菜单		设定	说明
文件	波形	文件名	wave1 wave2 wave3 wave4 选择存储波形的文件名。
		信源	CH1 CH2 选择需要保存的波形通道。
		保存	把信源的波形存储到指定文件名命名的csv文件中。
	图像	文件名	image1 image2 image3 image4 选择存储波图像的文件名。
		保存	把当前屏幕图像存储到指定文件名命名的bmp文件中。

如何进行系统设置

按下 **System** 按键，进入系统功能菜单。

● 显示

菜单说明如下表：

功能菜单	设定	说明
亮度	10%~100%	设置屏幕背光亮度，以10%循环递增。
背光时间	30s 60s 120s 无限	设置屏幕背光亮度时间，无限表示常亮。
菜单时间	5s 10s 20s 30s 60s	设置菜单显示时间。
已开机	00h:00m	显示已开机多长时间。

● 系统

菜单说明如下表：

功能菜单	设定	说明
语言		设置菜单语言。
关机时间	10分钟 30分钟 60分钟 无限	设置自动关机时间。无限表示不关机，若单使用电池时，请注意此项设置。
1/2		进入下一页菜单
关于		按下可显示仪器型号、序列号、版本等。
系统升级		进行系统升级，升级包版本需高于仪器本身版本。
2/2		返回上一页菜单

● 默认设置

按 **System** 按键，进入系统设置菜单，选择 **F3** 键 默认设置，屏幕显示提示“再按<**F3F3** 键，完成默认设置，否则请返回键。

● USB 连接

按 **System** 按键，进入系统设置菜单，选择 **F4** 键 进入下一页，按下 **F1** 按键，选择 **HID** 或 **MSC**。

- 1) **MSC[Mass Storage Class]**用于选择使用 USB 读取机身自带的存储容量存储的文件。
- 2) **HID[Human interface Device]** 用于选择示波器设备作为主机与电脑进行上位机控制与通信。

● 厂家设置

若要进行出厂设置，按下 **System** 键，按菜单选择键 **F4** 进入下一页，按下 **F2** 键，再按下 **F2** 键，确认执行，则恢复出厂设置。

● 自动校正

自校正程序可迅速地使示波器达到最佳状态，以取得最精确的测量值。您可以在任何时候执行这个程序，但如果环境温度变化范围达到或超过 5℃时，您必须执行这个程序。

若要进行自校正，应将所有探头或导线与输入连接器断开。然后，按 **System** 键，按菜单选择键 **F4** 进入下一页，按下菜单选择键 **F3**，确认准备就绪后执行自动校正。

4. 使用万用表

关于本章

本章逐步介绍了示波器的万用表功能，提供了一些如何使用菜单及进行基本操作的基础范例。

仪表界面

万用表使用四个安全香蕉插口输入端：分别为 A、mA、COM、VΩ→C。

万用表界面：



万用表界面

说明：

- 1. 测量种类指示：

 电压	-----	直流电压测量
 电压	-----	交流电压测量
 电流	-----	直流电流测量
 电流	-----	交流电流测量
 电阻	-----	电阻测量
 二极管	-----	二极管测量
 通断	-----	通断测量
 电容	-----	电容测量

2. 量程指示：手动 表示手动量程，自动 表示自动量程。
3. 当前测量量程。
4. 表示当前有USB数据线插入。
5. 电池电量及外部供电指示。
6. Hold可以使当前读数保持在显示屏上。
7. 测量数值及单位。
8. 切换电阻、蜂鸣器、 二极管、 电容测量功能显示处。
9. 电压测量时选择的量程 V 或 mV；电流测量时选择的量程 A 或 mA。
10. 选择测量交流电流或直流电流。
11. 选择测量交流电压或直流电压。
12. 相对值测量功能显示（仅在测量直流电流， 直流电压、电阻状态下可用）。

5. 使用信号发生器（仅 UT82B/UT82D/UT82F）

仪器可提供正弦波、矩形波、锯齿波、脉冲波 4 种基本波形，以及 8 种任意波形。

连接输出端

按 **Mode** 按键，将仪器界面切到信号发生器界面，注意屏幕左上角是否为 **ON**，若为 **OFF**，请按下 **运行/停止** 按键进行切换。

将 BNC 电缆连接至示波器顶部标有 **GEN Out** 的信号发生器输出端。

注意：信号源输出口（GEN Out）不能输入任何信号、电压、电流等电气。

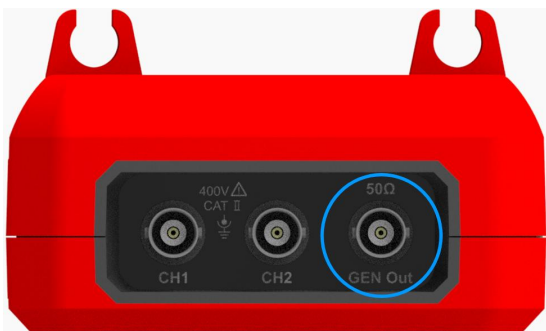


图 5- 1：信号发生器输出端

若要查看信号发生器的输出，可将 BNC 电缆的另一端连接至示波器前面板的信号输入通道。

设置波形

- (1) 按 **Mode** 按键，将仪器界面切到信号发生器界面。
- (2) 在 **F1** 选择所需波形，屏幕将显示对应波形的设置菜单。
- (3) 通过操作面板 **F2-F4** 和 **▲ ▼ ◀ ▶** 面板按键设置所需波形的参数。

设置负载

按下 **System** 按键，进入系统菜单。

按下 **F4** 按键，进入下一页菜单。

按下 **F3** 按键，可切换高阻 / *Ω (“*” 代表一个数值，默认值为 50 Ω)。

注：要改变负载值，在上一步选择 *Ω 后，按 ◀ ▶ 方向键可左右移动光标；按 ▲ ▼ 方向键可以改变选中位数值，可输入的负载值范围为 1 Ω ~ 10k Ω。

输出正弦波

正弦波设置菜单包括：频率/周期、幅度/高电平、偏移/低电平。

设置频率/周期

按下 **F1** 按键，切换到正弦波设置界面。

按下 **F3** 或 **F4** 按键，切换到 频率/周期 参数，被选中的参数项字体将以绿色显示（下同），再通过 ▲ ▼ ◀ ▶ 方向按键通过在参数栏中设置所需的参数值。再按 **F2** 键可切换频率/周期。

使用 ▲ ▼ ◀ ▶ 方向按键改变选中的参数值：

按 ▲ ▼ 可使光标处的数值增大或减小。按 ◀ ▶ 方向键可左右移动光标至不同的数值位。

注：设置参数时，长按按键可以加速改变数值。

设置幅度/高电平

按下 **F3** 或 **F4** 按键，切换到 幅度/高电平 参数，再通过 ▲ ▼ ◀ ▶ 方向按键通过在参数栏中设置所需的参数值。再按 **F2** 键可切换幅度/高电平。

设置偏移/低电平

按下 **F3** 或 **F4** 按键，切换到 偏移/低电平 参数，再通过 ▲ ▼ ◀ ▶ 方向按键通过在参数栏中设置所需的参数值。再按 **F2** 键可切换偏移/低电平。

输出矩形波

按下 **F1** 按键，切换到矩形波设置界面。

矩形波的设置菜单包括：频率/周期、幅度/高电平、偏移/低电平。

关于设置频率/周期、幅度/高电平、偏移/低电平，请参看 P29 的“输出正弦波”。

输出锯齿波

按下 **F1** 按键，切换到锯齿波设置界面。

锯齿波的设置菜单包括：频率/周期、幅度/高电平、偏移/低电平、对称度。

关于设置频率/周期、幅度/高电平、偏移/低电平，请参看 P29 的“输出正弦波”。

设置锯齿波的对称度

按下 **F3** 或 **F4** 按键，切换到 **对称度** 参数，通过 ▲ ▼ ◀ ▶ 方向按键通过在参数栏中设置所需的参数值。

输出脉冲波

按下 **F1** 按键，切换到脉冲波设置界面。

脉冲波的设置菜单包括：**频率/周期**、**幅度/高电平**、**偏移/低电平**、**脉宽/占空比**、**上升时间/下降时间**。

关于设置频率/周期、幅度/高电平、偏移/低电平，请参看 P29 的“输出正弦波”。

设置脉冲波的脉宽/占空比

按下 **F3** 或 **F4** 按键，切换到 **脉宽/占空比** 参数，再通过 ▲ ▼ ◀ ▶ 方向按键通过在参数栏中设置所需的参数值。再按 **F2** 键可切换脉宽/占空比。

设置上升时间/下降时间

按下 **F3** 或 **F4** 按键，切换到 **上升时间/下降时间** 参数，再通过 ▲ ▼ ◀ ▶ 方向按键通过在参数栏中设置所需的参数值。再按 **F2** 键可切换上升时间/下降时间。

输出任意波

按下 **F1** 按键，切换到任意波设置界面。

任意波的设置菜单包括：**频率/周期**、**幅度/高电平**、**偏移/低电平**、**类型**。

关于设置频率/周期、幅度/高电平、偏移/低电平，请参看 P29 的“输出正弦波”。

类型（内置波形）

系统内置 8 种波形。欲选择内置波形，如下：

按下 **F3** 或 **F4** 按键，切换到 **类型** 参数，再通过 **F2** 或 ▲ ▼ ◀ ▶ 方向按键通过在参数栏中设置所需的内置波形。

任意波内置波形表:

名称	说明
AmpALT	衰减振荡曲线
AttALT	增益振荡曲线
StairDn	阶梯下降
StairUD	阶梯上升/下降
StairUp	阶梯上升
Besselj	第 I 类贝塞尔函数
Bessely	第 II 类贝塞尔函数
Sinc	Sinc 函数

6. 与计算机上位机软件通讯

示波器支持通过 USB 与计算机上位机进行通讯。安装在计算机的示波器上位机软件提供了对示波器测量数据的存储、分析和显示以及远程控制等功能。

对于示波器上位机软件的具体操作方法，请在我们的下载官网下载并查看上位机帮助文档。

下面介绍怎样与计算机进行连接。请在我们的官网获取上位机软件安装包到您的计算机上，并双击它，根据提示点击直至安装完成。

- (1) **连接：**用 USB 数据线将示波器 **USB 通讯接口**与计算机的 USB 接口连接起来。
- (2) **USB 口设置：**示波器的 USB 接口协议类型需切换为 **HID**(按 **System** → **F4**→ **USB** ，切换为 **HID**)。
- (3) 打开示波器软件，在软件界面的右下角的连接状态提示变为绿色。

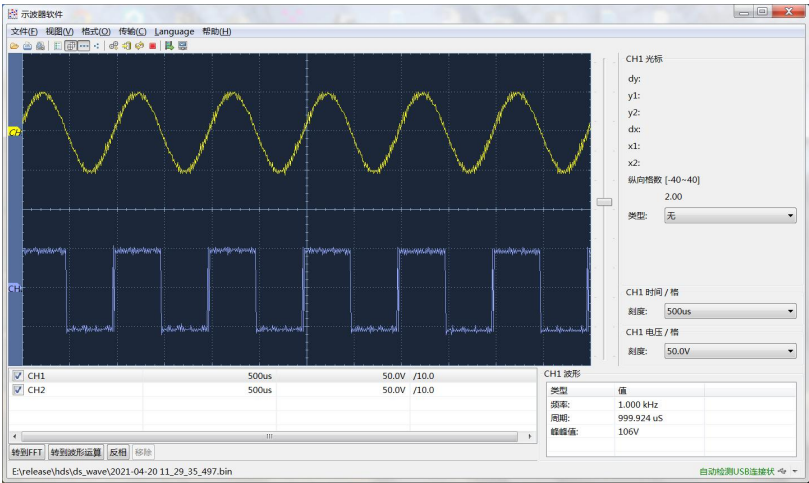


图 6- 1：通过 USB 接口与计算机连接

7. 故障处理

1. 示波器不能启动。

可能是电池的电量已完全耗尽。这时，即使由电源适配器供电，示波器仍不能启动。首先需要给电池充电，先不要打开示波器。等待约15分钟后，再尝试打开示波器。如果仍然无法启动，请与我们联系，让我们为您服务。

2. 启动数秒钟后示波器即关闭。

可能是电池的电量已耗尽。查看屏幕左上方的电池符号。 符号表示电池已耗尽，必须充电。

3. 切换到万用表，测量种类显示 E。

可能是没有选择测量种类，这时，按下 **F4** 键，测量种类应会显示对应的测量种类。如果仍然显示 **E**，重新启动示波器。

4. 在示波器状态下，测量电压幅度值比实际值大 10 倍或小 10 倍。

检查通道衰减系数是否与实际使用的探头误差比例相符。

5. 在示波器状态下，有波形显示，但不能稳定下来。

- 检查触发模式菜单中的信源项是否与实际使用的信号通道相符。
- 检查触发电平是否已经超过波形范围。只有合理设置参数，波形才能稳定显示。

6. 在示波器状态下，按下 RUN/STOP 键无任何显示

检查触发模式菜单的触发方式是否在正常或单次，且触发电平超出波形范围。如果是，将触发电平居中，或者设置触发方式为自动。另外，按 **Auto** 键可自动完成以上设置。

7. 在示波器状态下，在采集模式中设置为平均值采样或显示设置中持续时间设置较长后，显示速度变慢。

这属于正常现象。

8. 技术规格

除非另有说明，所用技术规格都适用于衰减开关设定为10X 的探头和本系列示波器。示波器必须首先满足以下两个条件，才能达到这些规格标准：

- 仪器必须在规定的操作温度下连续运行三十分钟以上。
- 如果操作温度变化范围达到或超过5℃，必须打开系统功能菜单，执行“自动校正”程序（请参见P23的“如何进行系统设置”中的自动校正）。

除标有“典型”字样的规格以外，所用规格都有保证。

示波器

特性		说明					
		UT82A	UT82B	UT82C	UT82D	UT82E	UT82F
模拟带宽		50MHz	50MHz	100MHz	100MHz	200MHz	200MHz
垂直分辨率		8 bit					
通道		2	2+1	2	2+1	2	2+1
采样	采样方式	采样，峰值检测					
	实时采样率	250MSa/s	250MSa/s	500MSa/s	500MSa/s	1GSa/s	1GSa/s
	波形刷新率	10.000 wfms/s					
输入	输入耦合	直流、交流、接地					
	输入阻抗（直流耦合）	1 M Ω $\pm$ 2%，与 16pF $\pm$ 10 pF 并联					
	探头衰减系数	1X 、10X、100X、1000X 、10000X					
	最大输入电压	400 V（DC + AC 峰值）					
	带宽限制	20 MHz ，全带宽					
水平	采样率范围	0.25Sa/s ~250MSa/s	0.25Sa/s~250MSa/s	0.25Sa/s~500MSa/s	0.25Sa/s~500MSa/s	0.25Sa/s~1GSa/s	0.25Sa/s~1GSa/s
	波形内插	(Sinx)/x					
	扫速范围 (S/div)	5ns/div -1000s/div, 按 1 - 2 - 5 进	5ns/div -1000s/div, 按 1 - 2 - 5 进制方	2ns/div -1000s/div, 按 1 - 2 -	2ns/div -1000s/div, 按 1 - 2 -	1ns/div-1000s/div, 按 1 - 2 - 5 进制方式	1ns/div-1000s/div, 按 1-2 - 5 进制方式

		制方式步进	式步进	5 进制方式步进	5 进制方式步进	步进	步进
	时基精度	±100ppm					
	记录长度	8K 或 4K 可选					
垂直	灵敏度（伏/格）范围	10 mV/div~10 V/div					
	位移范围	±6 格		±2 V (10 mV/div - 200 mV/div) ; ±100 V (500 mV/div - 10V/div)			
	模拟带宽	50 MHz	50 MHz	100 MHz	100 MHz	200 MHz	200 MHz
	低频响应（交流耦合，-3dB）	≥10 Hz					
	上升时间（BNC 上典型的）	≤ 7 ns	≤7 ns	≤3.5ns	≤3.5ns	≤1.75ns	≤1.75ns
	直流增益精确度	±3%					
测量	光标测量	光标间电压差（ΔV）、光标间时间差（ΔT）					
	自动测量	周期、频率、幅度、峰峰值、最大值、最小值、平均值、均方根值、上升时间、下降时间				周期、频率、幅度、峰峰值、最大值、最小值、平均值、均方根值、上升时间、下降时间、正脉宽、负脉宽	
触发	信源	CH1、CH2					
	类型	边沿触发					
	耦合	直流、交流					
	触发类型	自动、正常、单次					
	触发电平范围	距屏幕中心 ±4 格					
	触发电平精确度	±0.3 格					
	触发位移	根据存储深度和时基档位不同					
边沿触发	上升沿、下降沿						
特性		说明					
输出电压（典型的）		约 3.3Vpp，高阻					
频率（典型的）		方波 1 kHz（±1%）					
万用表							
特性		说明					
数字显示		24000 读数					

测量种类	电压、电流、电阻、电容、通断、二极管		
最大输入电压	AC : 750V DC : 1000V		
最大输入电流	AC : 10A DC : 10A		
基本功能	量程	最小分辨率	精度
直流电压	240.00mV	0.01mV	$\pm (0.3\%+10\text{dig})$
	2.4000V	0.1mV	$\pm (0.3\%+5\text{dig})$
	24.000V	1mV	
	240.00V	0.01V	
	1000.0V	0.1V	
交流电压 ^[1]	240.00mV	0.01mV	$\pm (0.8\%+10\text{dig})$
	2.4000V	0.1mV	
	24.000V	1mV	
	240.00V	0.01V	
	750.0V	0.1V	$\pm (1\%+10\text{dig})$
频率范围: 40Hz—1000Hz			
直流电流	240.00mA	0.01mA	$\pm (0.8\%+10\text{dig})$
	10.000A	1mA	$\pm (2.5\%+10\text{dig})$
	过载保护: 毫安档: 自恢复 400mA/250V; 安培档: 10A/600V, D5.2*20, 快断		
交流电流 ^[1]	240.00mA	0.01mA	$\pm (1\%+10\text{dig})$
	10.000A	1mA	$\pm (2.8\%+10\text{dig})$
	频率范围: 40Hz—1000Hz		
	过载保护: 毫安档: 自恢复 400mA/250V; 安培档: 10A/600V, D5.2*20, 快断		
电阻	240.00 Ω	0.01 Ω	$\pm (0.8\%+10\text{dig})$
	2.4000k Ω	0.1 Ω	$\pm (0.8\%+5\text{dig})$
	24.000k Ω	1 Ω	$\pm (0.8\%+3\text{dig})$
电阻	240.00k Ω	10 Ω	
	2.4000M Ω	0.1k Ω	$\pm (1\%+3\text{dig})$
	24.000M Ω	1k Ω	$\pm (5\%+10\text{dig})$
电容 ^[1]	100.00M Ω	0.01M Ω	$\pm (5\%+10\text{dig})$
	20.000nF	1pF	$\pm (3.0\%+10\text{dig})$

	200.00nF	10pF	
	2.0000 μ F	0.1nF	
	20.000 μ F	1nF	
	200.00 μ F	10nF	
	2.0000mF	0.1uF	
其他	通断测试	√ (<50 Ω)	
	二极管测试	√ (约 3V)	
	自动量程	√	
	真有效值	√	

[1] 交流电压/电流、电容测量时，准确度保证范围为 5%至 100%量程。

信号发生器（仅 UT82B/UT82D/UT82F）

特性	说明	
频率特性	正弦波	0.1Hz~30MHz
	矩形波	0.1Hz~5MHz
	锯齿波	0.1Hz~1MHz
	脉冲波	0.1Hz~5MHz
	任意波	0.1Hz~5MHz
实时采样率	125MSa/s	
幅度(50 Ω)	0.01V _{pp} ~ 2.5V _{pp}	
直流偏移范围（高阻）	± (2.5V - 幅度 V _{pp} /2)	
频率分辨率	0.0001	
通道	1	
波形长度	8k	
垂直分辨率	14 bit	
输出阻抗	50 Ω	

一般技术规格

显示

特性	说明
显示类型	3.5 英寸的彩色液晶显示
显示分辨率	320 水平×240 垂直像素

显示色彩	65536 色
------	---------

电源

特性	说明
电源	100 - 240 VACRMS, 50/60 Hz, CAT II
	DC INPUT: 5VDC, 2A
耗电	UT82A/UT82B:<5 W UT82C/UT82D/UT82E/UT82F:<10W
电池	2600mAh*2 (18650)

环境

特性	说明
温度	工作温度: 0℃~40℃
	存贮温度: -20℃~+60℃
相对湿度	≤90%
高度	操作 3,000 米
	非操作 15,000 米
冷却方法	自然冷却

机械规格

特性	说明
尺寸	198 mm (长) × 96mm (高) × 38 mm (宽)
重量	约 0.6 公斤 (主机, 不含电池)

9. 附录

附录 A：装箱清单

名称	数量	备注
主机	一台	
电源适配器	一个	
USB连接线	一根	
无源探头	两根	
鳄鱼夹线	一根	仅UT82B/UT82D/UT82F
万用表表笔	一付	红黑各一支
使用手册	一本	
保修证 合格证	1份	

附录 B：保养和清洁维护

一般保养

请勿把仪器储存或放置在液晶显示屏会长时间受到直接日照的地方。

小心：请勿让喷雾剂、液体和溶剂沾到仪器或探头上，以免损坏仪器或探头。

清洁：

根据操作情况经常对仪器和探头进行检查。按照下列步骤清洁仪器外表面：

1. 请用质地柔软的布擦拭仪器和探头外部的浮尘。清洁液晶显示屏时，注意不要划伤透明的LCD 保护屏。
2. 用潮湿但不滴水的软布擦拭仪器，请注意断开电源。可使用柔和的清洁剂或清水擦洗。请勿使用任何磨蚀性的化学清洗剂，以免损坏仪器或探头。



警告：在重新通电使用前，请确认仪器已经干透，避免因水分造成电气短路甚至人身伤害。

电池充电及更换

设备在长期的存储过程中，有可能出现由于锂电池自放电所导致电量过低，设备不能开机，这属于正常现象。

请使用附带的适配器给设备进行预充电0.5 ~ 1小时（视存储时间而定）再开机。另，如果设备长时间不使用，建议每隔一段时间就充一下电，以免锂电池过放电。

电池充电

出厂时，锂电池可能并未充满电。要使电池电量充足，请参考下表进行充放电：

型号	充电时长	放电时长
UT82A UT82B	约 ≥ 4.5 小时	约 ≥ 4 小时
UT82C UT82D	约 ≥ 4.5 小时	约 ≤ 3 小时
UT82E UT82F	约 ≥ 4.5 小时	约 ≤ 1.5 小时

屏幕右上角的供电及电量指示符号说明如下：



符号表示开机充电状态；



符号表示电池供电；



符号表示大约只剩五分钟的使用时间，请按照相关提示尽快充电以免损伤电池。

充电方式

通过电源适配器对电池充电：通过随机配送的 USB 数据线和电源适配器将示波器连接到电源插座，进行充电。

通过 USB 接口对示波器充电：通过 USB 数据线将示波器连接到计算机或其他设备进行充电（应注意供电设备的带载能力，以免造成设备工作不正常）。

注意

为避免充电时电池过热，环境温度不得超过技术规格中给定的允许值。

更换锂电池组

通常不需要更换电池组。但当有这种需要时，只能由有资格的人员进行更换，并且只能使用**同规格的锂电池**。

1. Safety Terms and Symbols

(Before using this product, please read the safety information in advance.)

Safety Terms

Terms in this Manual. The following terms may appear in this manual:



Warning: Warning indicates the conditions or practices that could result in injury or loss of life.



Caution: Caution indicates the conditions or practices that could result in damage to this product or other property.

Terms on the Product. The following terms may appear on this product:

Danger: It indicates an injury or hazard may immediately happen.

Warning: It indicates an injury or hazard may be accessible potentially.

Caution: It indicates a potential damage to the instrument or other property might occur.

Safety Symbols

Symbols on the Product. The following symbol may appear on the product:



Hazardous Voltage



Refer to Manual



Protective Earth Terminal



Chassis Ground



Public Ground

Safety requirements

Before any operations, please read the following safety precautions to avoid any possible bodily injury and prevent this product or any other

products connected from damage. In order to avoid any contingent danger, this product is only used within the range specified.

 **Warning:**

To prevent electric shock or fire, use a suitable power adapter. Only power adapters that are dedicated to this product and approved for use in the country of use may be used.

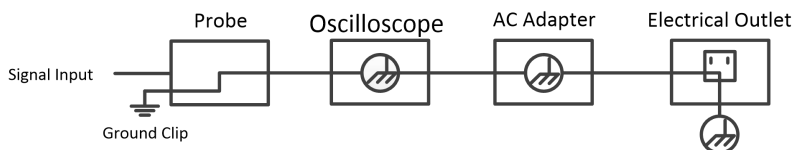
 **Warning:**

The two channels of the oscilloscope are not electrically isolated. The channels should adopt a common ground during measuring. To prevent short circuits, the 2 probe grounds must not be connected to 2 different non-isolated DC levels.

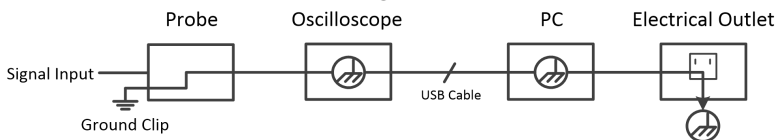
 **Warning:**

Note when measuring the channel to the public base, otherwise may cause short circuit because of the oscilloscope probe ground wire.

The diagram of the oscilloscope ground wire connection:



Schematic diagram of internal ground connection when oscilloscope is connected with computer through the port:



When the oscilloscope is AC powered by adapter or connected with AC powered computer through the port, it is not allowed to measure the primary power supply of power grid.

 **Warning:**

If the input port of the oscilloscope is connected to a voltage with a peak

value higher than 42V (30vrms) or a circuit with a peak value of more than 4800 VA, the following measures shall be taken to avoid electric shock or fire:

- Only voltage probes, test wires and adapters with proper insulation attached to the oscilloscope or accessories suitable for oscilloscope instrument series products specified by our company shall be used.
- Before use, check the multimeter test probe, oscilloscope probe and accessories for mechanical damage. If damage available, replace it.
- Remove all unused multimeter test probes, oscilloscope probes and accessories (power adapter, USB, etc.).
- Firstly, plug the power adapter into the AC socket, and then connect it to the oscilloscope.
- When testing in a CAT II environment, do not connect a voltage higher than 400 V to any input port.
- When testing in a CAT II environment, do not connect a voltage with a voltage difference of more than 400 V to the isolated input port.
- Do not use an input voltage higher than the rated value of the instrument. Pay special attention when using 1:1 test wires, because the probe voltage will be directly transmitted to the oscilloscope.
- Do not touch the bare metal BNC or banana plug.
- Do not insert metal objects into the connector.
- Use the oscilloscope only in the specified way.
- The voltage rating mentioned in the "warning" information is the limited value of "working voltage". They represent V ac rms (50-60 Hz) in AC sine wave applications; and V dc in DC applications. CAT is the prefix, and II refers to the level. Level II is the low voltage and high energy level, which refers to the local electrical level applicable to electrical appliances and portable equipment.
- Do not input any electric such as signal, voltage or current into the GEN Out port of the signal generator.

- **Only a qualified person should perform internal maintenance.**
- **Check all Terminal Ratings.** To avoid fire or shock hazard, check all ratings and markings on this product. Refer to the user manual for more information about ratings before connecting to the instrument.
- **Do not operate without covers.** Do not operate the instrument with covers or panels removed.
- **Avoid exposed circuit.** Be careful when working on exposed circuitry to avoid risk of electric shock or other injury.
- **Do not operate if any damage.** If you suspect damage to the instrument, have it inspected by qualified service personnel before further use.
- **Do not operate in damp conditions.**
- **Do not operate in an explosive atmosphere.**
- **Keep product surfaces clean and dry.**
- **Using the equipment not in accordance with the method specified by the manufacturer may damage the protection provided by the equipment.**

2. How to Implement the General Inspection

After you get a new oscilloscope, it is recommended that you should make a check on the instrument according to the following steps:

1. Check whether there is any damage caused by transportation

If it is found that the packaging carton or the foamed plastic protection cushion has suffered serious damage, do not throw it away first till the complete device and its accessories succeed in the electrical and mechanical property tests.

2. Check the Accessories

The supplied accessories have been already described in the "Appendix A: List of Accessories" of this Manual. You can check whether there is any loss of accessories with reference to this description. If it is found that there is any accessory lost or damaged, please get in touch with our distributor responsible for this service or our local offices.

3. Check the Complete Instrument

If it is found that there is damage to the appearance of the instrument, or the instrument can not work normally, or fails in the performance test, please get in touch with our distributor responsible for this business or our local offices. If there is damage to the instrument caused by the transportation, please keep the package. With the transportation department or our distributor responsible for this business informed about it, a repairing or replacement of the instrument will be arranged by us.

3. How to Use the Oscilloscope

The Structure of the Oscilloscope

Front Panel and Keys

The front panel and keys of the oscilloscope are shown in below:

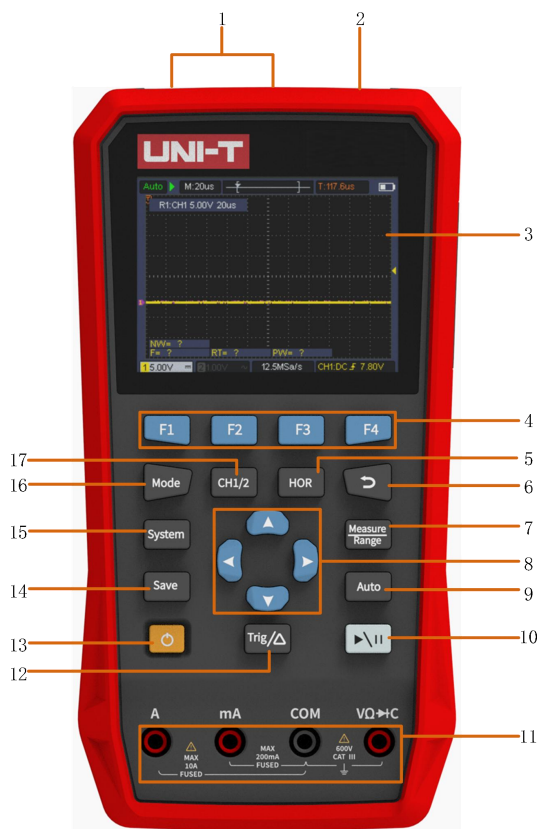


Figure 3- 1:Front Panel of the Oscilloscope

Description:

1. CH1 and CH2 input connectors.
2. Waveform generator output connector (optional).
3. Display area.
4. The **F1 - F4** keys are multi-function keys. In each menu mode, press the corresponding key to select the corresponding menu item.
5. After pressing the **HOR** key, through the key  , you can change the horizontal time base setting, and observe the change of the state information caused by it; it can also be found that the **horizontal time base** display corresponding to the status bar has changed correspondingly; the horizontal displacement of the signal in the waveform window can be adjusted by pressing  .
6. Return key. Press this key to return to the previous menu; when the menu is the first level, press the return key to close the menu.
7. Measurement menu key (oscilloscope) or range key (multimeter).
8. Zoom or move key:

Function of direction keys   : used for the up and down movements of waveform, the time base changing, the voltage cursor movements and the trigger of electrical level change in the oscilloscope;

Function of direction keys   : used for the left and right movements of waveform, the voltage position changing and the movements of time cursor in the oscilloscope.
9. Automatic setting key (oscilloscope) or automatic range key (multimeter).
10. Stop / run key (oscilloscope) or value hold key (multimeter) or turn on/off the signal output (waveform generator - optional).
11. Input end of the multimeter.
12. Trigger menu key (oscilloscope) or relative value key (multimeter).
13. : Power switch key.
14. Enter the save settings key.

15. Enter the system settings key.
16. Switch key for working state of oscilloscope and multimeter.
17. CH1 / CH2 channel switch key.

Side Panel



Figure 3-2: Side Panel of the Oscilloscope

Description:

1. Probe compensation: 3.3V/1kHz square wave signal output.
2. Charging or USB communication interface.
3. Bracket.

Introduction to the User Interface of the Oscilloscope

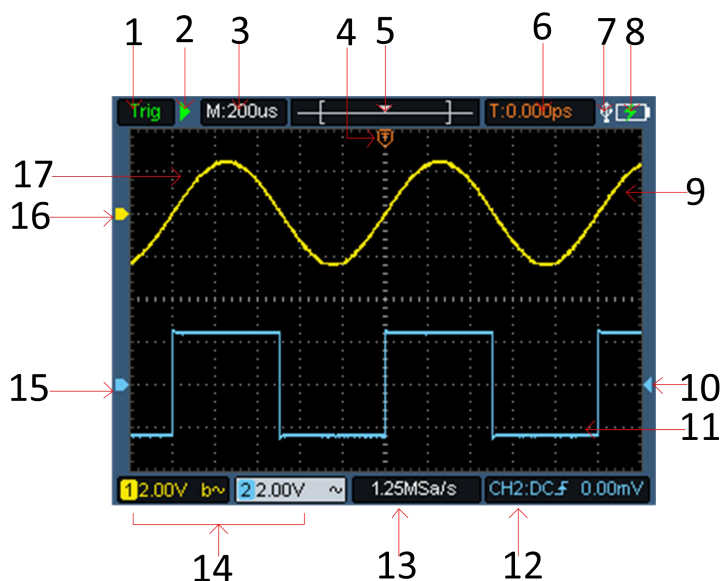


Figure 3-3: Oscilloscope Interface

Description:

1. The trigger status indicates the following information:
 Auto: Automatic mode. The waveform is being collected without triggering.
 Trig: A trigger has been detected and post trigger information is being collected.
 Ready: All pre trigger data have been obtained and the oscilloscope is ready.
 Scan: Scan mode. Continuously collect and display waveform data.
 Stop: Stop collecting waveform data.
2. Run/stop.
3. Time base display.
4. The pointer indicates the trigger horizontal position.
5. The pointer indicates the trigger position within the current storage depth.

6. Indicating the value of the current trigger horizontal displacement, and displaying the position of the current waveform window in the memory.
7. It indicates that there is a USB disk connecting.
8. Battery power and external power supply indication.
9. Channel 1 waveform.
10. The pointer indicates the trigger electrical level position of the channel.
11. Channel 2 waveform.
12. The icon indicates trigger-related information, including trigger channel, coupling mode, trigger type and trigger electrical level. For details, please refer to P61 Trigger System.
13. The current sampling rate.
14. The channel information reading indicates the voltage position of the corresponding channel.
The icon indicates the coupling mode of the channel:
"—" means DC coupling;
"~" means AC coupling;
"" means ground coupling.
15. The pointer indicates the grounding reference point (zero position) of the waveform displayed in CH2 channel. If there is no pointer indicating the channel, it means that the channel is not open.
16. The pointer indicates the grounding reference point (zero position) of the waveform displayed in CH1 channel. If there is no pointer indicating the channel, it means that the channel is not open.
17. Waveform display area.

Functional Check

Making a quick functional check to verify that the instrument is working properly. Please proceed as follows:

1. Press the switch at the bottom left of the main unit .

The internal relay will make a slight click. The instrument executes all self-check items, and the startup screen appears. Press the front panel key **System**, the default probe menu attenuation coefficient setting value is **10X**.

2. The switch on the oscilloscope probe is set to 10X and connected with the CH1 channel.

Align the slot on the probe with the plug on the bayonet nut connector (**BNC**) of the **CH1** connector and insert it, then turn the probe to the right and tighten it.

Connect the probe tip and ground clamp to the connector of the probe compensator. Please pay attention to the terminal polarity. The square terminal represents the signal output, and the round terminal represents the reference ground.

3. Press the "Auto" key on the front panel.

Within a few seconds, a square wave display (1kHz/3.3Vpp) can be seen, as shown in Figure 3-4.

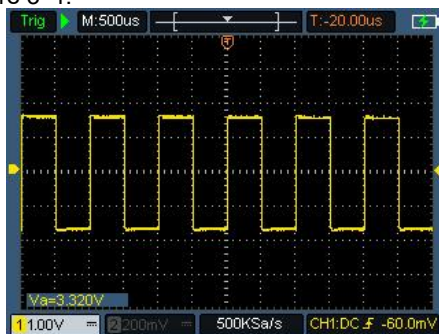


Figure 3-4: Automatic Setting

Repeat steps 2 and 3 on the CH2 channel.

Probe Compensation

When connecting the probe to any input channel for the first time, make this adjustment to match the probe with the input channel. The probe without compensation or deviation compensation will lead to measurement error. To adjust the probe compensation, please follow the following steps:

1. Set the probe menu attenuation coefficient to **10X**, and set the switch on the probe to **10X** (see "Probe Attenuation Coefficient Setting" in P54), and connect with CH1. If a hook probe is used, make sure it is in close contact with the probe. Connect the probe tip to the signal output connector of the probe compensator, and connect the reference wire clamp to the ground wire connector of the probe compensator, and then press the **Auto** key on the front panel.
2. Check the displayed waveform and adjust the probe until the compensation is correct. See Figure 3-5 and Figure 3-6.

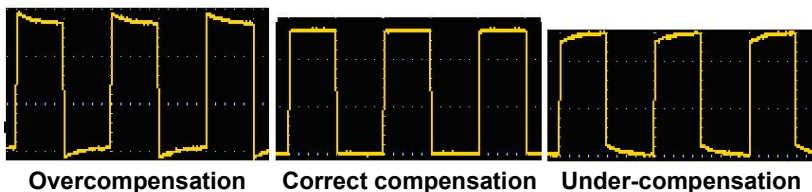


Figure 3-5: Display Waveform of Probe Compensation

3. Repeat the steps if necessary.

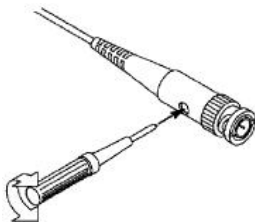


Figure 3-6: Probe Adjustment

Probe Attenuation Coefficient Setting

The probe has a variety of attenuation coefficients, which will affect the vertical position factor of the oscilloscope.

To change (check) the set value of probe attenuation coefficient in the oscilloscope menu, please follow the steps below:

- (1) Press the **CH1/CH2** key to switch the channel to be used.
- (2) Press the **F3** to select the desired attenuation coefficient. This setting is valid until it is changed again.



Note: The preset setting of the probe attenuation coefficient in the menu when the oscilloscope is delivered is 10X. Make sure that the attenuation switch setting value on the probe is the same as the probe attenuation coefficient option in the oscilloscope menu.

The setting value of the probe switch is **1X** and **10X**. See Figure 3-7.



Figure 3-7: Probe Attenuation Switch



Note: When the attenuation switch is set to **1X**, the probe limits the bandwidth of the oscilloscope to **5MHz**. To use the full bandwidth of the oscilloscope, be sure to set the switch to **10X**.

Safe Use of Probe

The safety ring surrounding the probe body provides a barrier to protect the fingers from electric shocks. See Figure 3-8.



Figure 3-8: Finger Safety Ring of the Probe



Warning: To prevent electric shock when using the probe, please keep your fingers behind the safety ring on the probe body.

To prevent electric shock when using the probe, do not touch the metal part of the probe head when the probe is connected to a voltage source.

Before making any measurements, connect the probe to the instrument and connect the ground terminal to the ground.

Vertical System

The vertical system can be used to adjust the vertical scale, the position and other settings of the channel. Each channel has a separate vertical menu, which can be set individually for each channel.

Vertical position

Press the **CH1/CH2** keys to select the channel, and move the vertical position of the selected channel up or down by pressing the ▲ or ▼ direction keys. Press the ▲ and ▼ direction keys at the same time to center the vertical position.

Vertical Volt/Div Setting

The volt/div range is 10mV/div-10V/div (probe 1X), stepping in the 1-2-5 way, or 100mV/div-100V/div (probe 10X), 1V/div-1000V/div (probe 100X), 10V/div-10000V/div (probe 1000X) , 100V/div-100000V/div (probe 10000X).

Press the **CH1/CH2** key to select the channel, and press the ◀ or ▶ direction key to change the volts/div setting of the selected channel.

The description of the vertical system setting menu is as follows:

Function menu	Setting	Description
Switch	ON OFF	Turn on the waveform display. Turn off the waveform display.
Coupling	DC AC GND	The normal sampling method uses the AC and DC components of the input signal. Block the DC component of the input signal. Disconnect the input signal.
Probe	1X 10X 100X 1000X 10000X	Choose one of the values according to the probe attenuation factor to keep the vertical scale reading accurate.

Bandwidth	20MHz	Limit the bandwidth to 20MHz to reduce display noise.
	Full band	The bandwidth of the oscilloscope.

Horizontal System

Press the **HOR** key to enter the horizontal system setting menu. Use the ◀ and ▶ direction keys to change the horizontal scale (time base) and horizontal trigger position. When changing the horizontal scale, the waveform is enlarged or reduced relative to the center of the screen. When the horizontal position changes, the position relative to the waveform trigger point changes.

Note: Press the ◀ and ▶ direction keys at the same time to center the horizontal position.

The description of the horizontal system setting menu is as follows:

Function menu	Setting	Description
Acqu Mode	Sample	Normal sampling method.
	Peak Detect	Used to detect interference glitches and reduce the possibility of confusion.
Length	4K 8K	Select the length to be recorded.
XY Mode	ON OFF	Choose to turn XY mode on or off.
1/2		Enter the next menu.
Refresh	High Low	Set the refresh rate to "High" or "Low".
Hor Center		Set the horizontal trigger position in the middle of the screen.
Counter	ON OFF	Turn on/off counter.
2/2		Return to the previous menu.

Measuring System

Automatic Measurement

Measure Range

Press **Measure Range** and **F1** key to realize automatic measurement. There are up to 9 types of measurement can be displayed at the bottom left of the screen.

For bandwidth **≤100MHz** models, automatic range types include Frequency, Period, Amplitude, Maximum, Minimum, Peak-to-Peak value, and Mean.

For bandwidth **200MHz** models, automatic range types include Frequency, Period, Amplitude, Maximum, Minimum, Peak-to-Peak value, Mean, RMS, Rise Time, Fall Time, +PulseWidth, -PulseWidth.

The description of the automatic measurement **Function Menu** is as follows:

Function Menu			Description
Measure	ON OFF		Turn automatic measurement on or off.
	Source	CH1 CH2	Set the source.
	Add Del	Freq (F) ☐ Period (T) ☐ Amp (Va) ☐ Min (Mi) ☐ Max (Ma) ☐ PK - PK (Vpp) ☐ Mean(V) ☐ RMS (RMS) ☐ Rise Time (RT) ☐ Fall Time (FT) ☐ +PulseWidth (PW) ☐ -PulseWidth (NW) ☐	Add or delete the selected measurement type (displayed in the lower left corner, up to 9 types). Note: The unselected state is ☐ ; The selected state is ☒ .

The automatic measurement of voltage parameters

The oscilloscopes provide automatic voltage measurements including Mean, PK-PK, RMS, Max, Min and Vamp. *Figure 3-9* below shows a pulse with some of the voltage measurement points.

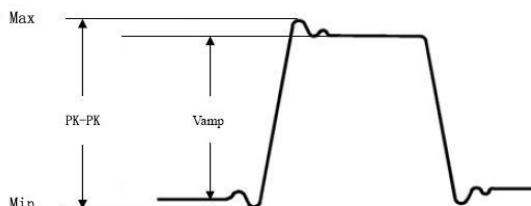


Figure 3-9

Mean: The arithmetic mean over the entire waveform.

PK-PK: Peak-to-Peak Voltage.

RMS: The true Root Mean Square voltage over the entire waveform.

Max: The maximum amplitude. The most positive peak voltage measured over the entire waveform.

Min: The minimum amplitude. The most negative peak voltage measured over the entire waveform.

Vamp: Voltage between Vtop and Vbase of a waveform.

The automatic measurement of time parameters

The oscilloscopes provide time parameters auto-measurements include Period, Frequency, Rise Time, Fall Time, +D width and -D width.

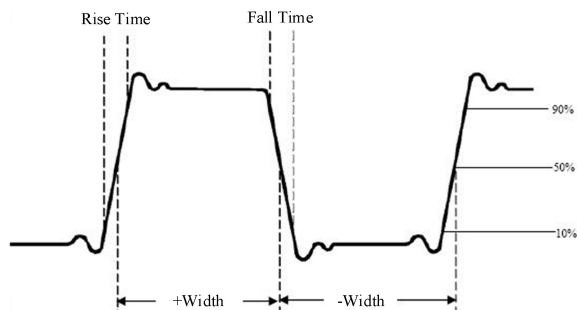


Figure 3-10

Rise Time: Time that the leading edge of the first pulse in the waveform takes to rise from 10% to 90% of its amplitude.

Fall Time: Time that the falling edge of the first pulse in the waveform takes to fall from 90% to 10% of its amplitude.

+D width: The width of the first positive pulse in 50% amplitude points.

-D width: The width of the first negative pulse in the 50% amplitude points.

Cursor Measurement

Measure

Press **Range** and **F2** key to realize cursor measurement.

The description of **Cursor Measurement Menu** is as follows:

Function Menu	Setting	Description
Type	CH1 Voltage	Select to display the CH1 voltage measurement cursor and menu.
	CH2 Voltage	Select to display the CH2 voltage measurement cursor and menu.
	Time	Select to display the time measurement cursor and menu.

	None	Turn off the cursor measurement.
A		When the type is selected as CH1 Voltage or CH2 Voltage , press the arrow keys   to move the cursor line A; when the type is selected as Time , press the arrow keys   to move the cursor line a.
B		When the type is selected as CH1 Voltage or CH2 Voltage , press the arrow keys   to move the cursor line B; when the type is selected as Time , press the arrow keys   to move the cursor line b.
AB		Link A and B. When the type is selected as CH1 or CH2 , by pressing the arrow keys   two cursors can be moved at the same time; when the type is selected as Time , by pressing the arrow keys   , two cursors can be moved at the same time.

Display unknown signals using automatic Settings

The automatic setting function enables the oscilloscope to automatically display and measure unknown signals. This function optimizes position, range, timebase, and trigger and ensures a stable display of any waveform. This feature is particularly useful for quickly checking several signals.

To enable auto-setup, perform the following steps:

1. Connect the oscilloscope probe to the measured signal.
2. Press the **Auto** key, the oscilloscope enters the automatic measurement state, and the measured signal will be displayed on the screen.

Trigger System

The trigger determines when the oscilloscope starts to acquire data and display waveforms. Once the trigger is set correctly, it can convert an unstable display into a meaningful waveform.

When the oscilloscope starts to acquire data, it first acquires enough data to draw the waveform on the left side of the trigger point. The oscilloscope continuously acquires data while waiting for the trigger condition to occur. When a trigger is detected, the oscilloscope continuously acquires enough data to draw a waveform on the right of the trigger point.

The trigger mode of this series of oscilloscopes is edge trigger.

The edge trigger mode is to trigger on the trigger electrical level of the edge of the input signal, that is, trigger on the rising and falling edges of the input signal.

Entering the edge trigger, the trigger setting information is displayed at the bottom right corner of the screen, e.g. **CH1:DC F -20.0mV**. It indicates that the trigger type is rising edge, the trigger source is CH1, the trigger coupling is DC, and the trigger electrical level is -20.0mV.

The description of the trigger system setting menu is as follows:

Function Menu	Setting	Description
Source	CH1 CH2	Set Channel 1 as the source trigger signal. Set Channel 2 as the source trigger signal.
Coupling	AC DC	Set to prevent DC component from passing through. Set to allow all components to pass through.
Type	Auto Normal Single	Waveforms can be acquired without detecting trigger conditions. The waveform is acquired only when the trigger conditions are met. When a trigger is detected, a waveform is sampled and then stopped.
1/2		Enter the next menu.
Slope	Rising edge Falling edge	Trigger on the rising edge of the signal. Trigger on the falling edge of the signal.
Trigger center		The trigger position is set in the middle of the waveform.
Force		Forced trigger key, which forcibly generates a trigger signal, mainly used in the "normal" and "single" modes of the trigger mode.

2/2		Return to the previous menu.
-----	--	------------------------------

Trigger electrical level: The amplitude level that the signal must cross when setting the waveform acquisition. Press the **Trig/△** key to enter the trigger menu, and press the ▲ or ▼ key to move the trigger electrical level up and down.

Save Settings

Press the **Save** key to enter the save function menu. By operating the save function menu, oscilloscope settings, reference waveforms, and files can be stored.

● Configure

Any setting can be saved inside the oscilloscope, and restore settings can also be called.

The description of **Configure** menu is as follows:

Function Menu	Setting	Description
Object	S1 S2 S3 S4	Set waveform name.
Save		Save the current parameter settings of the oscilloscope to the internal memory.
Recall		Call the settings saved in the current storage location.

● Reference Waveform

The actual waveform can be compared with the reference waveform to find out the difference. Press the **Save** key to enter the save function menu, and press **F2** to select the reference waveform to enter the reference waveform menu.

The description of the **Reference Waveform** menu is as follows:

Function Menu	Setting	Description
Source	CH1 CH2	Select the reference waveform to be saved.
Object	R1	Set waveform name.

	R2 R3 R4	
Display	ON OFF	Call or close the waveform of the current target address in the internal memory. When it displays "On", if there is a stored waveform at the current address, the waveform will be displayed, and the address number and waveform related information will be displayed in the upper left corner; if the current address is not stored, it will display "Address No.: No waveform saved".
Save		Save the reference waveform of the source to the memory.

● File

The file can be saved as waveform or image. The waveform and image can be read by plugging and unplugging the USB data cable or selecting MSC in the USB option on the next page of system settings.

The description of **File** menu is as follows:

Function Menu		Setting		Description
File	Wave	File name	wave1 wave2 wave3 wave4	Select the file name of the stored waveform.
		Source	CH1 CH2	Select the waveform channel to be saved.
		Save		Store the waveform of the source in a csv file named by the specified file name.
	Image	File name	image1 image2 image3 image4	Select the file name of the stored wave image.
		Save		Store the current screen image in the bmp file named by the specified file name.

System Settings

Press the **System** key to enter the system function menu.

● Display

The description of the menu is as follows:

Function Menu	Setting	Description
Brightness	10% - 100%	Set the screen backlight to increase in a 10% cycle.
Backlight time	30s 60s 120s Unlimited	Set the screen backlight luminance time. Unlimited means always on.
Menu time	5s 10s 20s 30s 60s	Set the menu display time.
Turned on	00h: 00m	Display how long it has been powered on.

● System

The description of the menu is as follows:

Function Menu	Setting	Description
Language		Set the menu language.
Shutdown time	10 minutes 30 minutes 60 minutes Unlimited	Set the automatic shutdown time. Unlimited means no shutdown. Please pay attention to this setting if you use the battery only.
1/2		Enter the next menu
About		After pressing this key, the instrument model, serial number, version, and checksum can be displayed.
Upgrade		To upgrade the system. The version of the upgrade package must be higher than the version of the instrument itself.
2/2		Return to the previous menu

● Default Settings

Press the **System** key to enter the system setting menu. Select **F3** "Default Setting", the screen will prompt "Press < F3 >for default setting, otherwise press the Return key". If you need to perform the default setting, press **F3** again to complete the default setting, otherwise, press the return key.

- **USB Connection**

Press the **System** key to enter the system setting menu. Select **F4** to enter the next page. Press **F1** to select **HID** or **MSC**.

1) **MSC [Mass Storage Class]** is used to make USB read the files stored in the built-in memory.

2) **HID [Human interface Device]** is used to select the oscilloscope device as the host computer to control and communicate with the computer.

- **Factory Settings**

To set the factory settings, press the **System** key. Press the menu selection key **F4** to enter the next page. Press **F2** two times to confirm the execution. The factory settings are restored.

- **Automatic Correction**

The automatic correction program can quickly make the oscilloscope reach the best condition to obtain the most accurate measurement value. You can execute this program at any time, but if the ambient temperature variation range reaches or exceeds 5°C, you must execute this program.

To perform automatic correction, disconnect all probes or wires from the input connector. Then, press the **System** key. Press the menu selection key **F4** to enter the next page, and press the menu selection key **F3**. Perform automatic correction after confirming readiness.

4. How to Use the Multimeter

About This Chapter

This chapter introduces the multimeter function of the oscilloscope step by step, and provides some basic examples of basic operations and how to use the menu.

Instrument Interface

The multimeter uses four 4-mm safety banana plug input ends: **A**, **mA**, **COM**, and **VΩ→C**.

Multimeter interface:



Multimeter Interface

Description:

1. Measurement type indication:

---	DCV	-----	DC voltage measurement
~	ACV	-----	AC voltage measurement
---	DCA	-----	DC current measurement

~ ACA	-----	AC current measurement
 Resist	-----	Resistance measurement
 Diode	-----	Diode measurement
 Cont	-----	On/Off measurement
 Cap	-----	Capacitance measurement

2. Range indication: **Manual** means manual range; **Auto** means automatic range.
3. Current measurement range.
4. Indicating that there is a USB cable inserted.
5. Battery power indication.
6. "Hold" can keep the current reading on the display.
7. Measurement value and unit.
8. Display of switching resistance, buzzer, diode and capacitance measurement function.
9. The selected range V or mV in voltage measurement; the selected current range A or mA in current measurement.
10. To choose AC or DC current measurement.
11. To choose to AC or DC voltage measurement.
12. Display of relative value measurement function (only available when measuring DC current, DC voltage and resistance).

5. How to Use the Waveform Generator (Only UT82B/UT82D/UT82F)

The instrument can provide 4 basic waveforms, sine wave, square wave, ramp wave, pulse wave, and 8 arbitrary waveforms.

Connect the output

Press the **Mode** button to switch the instrument interface to the waveform generator function interface. Check whether the upper left corner of the screen is **ON**, if it is **OFF**, press the **Run/Stop** key to switch.

Connect the BNC cable to the port marked **GEN Out** in the top of the oscilloscope.

Warning:

Do not input any electric such as signal, voltage or current into the GEN Out port of the signal generator.



Figure 5- 1: Generator Output Ports

To observe the output of the waveform generator, connect the other end of the BNC cable to the signal input connector of the oscilloscope.

Set the waveform

- (1) Press the **Mode** button to switch the instrument interface to the waveform generator function interface.
- (2) Press **F1** to select the desired waveform, and the screen will display the corresponding waveform setting menu.
- (3) Set the parameters of the desired waveform through the operation panel

F2-F4 and the ▲ ▼ ◀ ▶ panel keys.

Set the load

Press the **System** key to enter the system function menu.

Press the **F4** key to enter the next page of menu.

Press the **F3** key to switch **High Z / *Ω** ("*" represents a value, the default is 50Ω).

Note: To change the load value, after selecting *Ω, press   direction key to move the cursor left and right; press  /  direction key to change the value. The load range is 1 Ω - 10 kΩ.

Output the sine waveform

The sine waveform setting menu includes: Freq/Period, Amplitude/High Level, Offset/Low Level.

Set the Frequency / Period

Press the **F1** key to enter the sine waveform setting interface.

Press the **F3** or **F4** key to switch to the Freq/Period parameter, the selected parameter item will be displayed in green (the same below), and then use the     direction keys to set the desired value in the parameter column.

Press **F2** to switch between Freq / Period.

Use the direction keys to change the selected parameter value:

Press  /  to increase or decrease the value at the cursor. Press   to move the cursor left and right to different numerical digits.

Note: When setting parameters, long press the key to accelerate the change of the value.

Set the Amplitude / High Level

Press the **F3** or **F4** key to switch to the **Amplitude/High Level** parameter, and then use the     direction keys to set the desired value in the parameter column. Press **F2** to switch between Amplitude / High Level.

Set the Offset / Low Level

Press the **F3** or **F4** key to switch to the **Offset/Low Level** parameter, and then use the     direction keys to set the desired value in the parameter column. Press **F2** to switch between Offset / Low Level.

Output the square waveform

Press the **F1** key to enter the square waveform setting interface.

The square waveform setting menu includes: **Freq/Period**, **Amplitude/High Level**, **Offset/Low Level**.

For the setting Freq/period, Amplitude/High level, Offset/Low level, please refer to Output the sine waveform on page 70.

Output the ramp waveform

Press the **F1** key to enter the ramp waveform setting interface.

The ramp waveform setting menu includes: **Freq/Period**, **Amplitude/High Level**, **Offset/Low Level**, **Symmetry**.

For the setting Freq/period, Amplitude/High level, Offset/Low level, please refer to Output the sine waveform on page 70.

Set the symmetry of the ramp waveform

Press the **F3** or **F4** key to switch to the **Symmetry** parameter, use the     direction keys to set the desired value in the parameter column.

Output the pulse waveform

Press the **F1** key to enter the pulse waveform setting interface.

The pulse waveform setting menu includes: Freq/Period, Amplitude/High Level, Offset/Low Level, Pulse width/Duty, Rise Time/Fall Time.

For the setting Freq/period, Amplitude/High level, Offset/Low level, please refer to Output the sine waveform on page 70.

Set the Pulse Width / Duty Cycle of the pulse waveform

Press the **F3** or **F4** key to switch to the Pulse width/Duty parameter, use the ▲ ▼ ◀ ▶ direction keys to set the desired value in the parameter column.

Press **F2** to switch between Pulse width / Duty.

Set the Rise Time/Fall Time

Press the **F3** or **F4** key to switch to the Rise Time/Fall Time parameter, use the ▲ ▼ ◀ ▶ direction keys to set the desired value in the parameter column. Press **F2** to switch between Rise Time / Fall Time.

Output the Arbitrary waveform

Press the **F1** key to enter the arbitrary waveform setting interface.

The arbitrary waveform setting menu includes: Freq/Period, Amplitude/High Level, Offset/Low Level, Type.

For the setting Freq/period, Amplitude/High level, Offset/Low level, please refer to Output the sine waveform on page 70.

Type (built-in waveform)

The system has 8 built-in waveforms. To select the built-in waveform:
Press the **F3** or **F4** key to switch to the **Type** parameter, and then use the **F2** or  direction keys to select the desired built-in waveform in the parameter column.

Built-in waveform list

Name	Explanation
AmpALT	Attenuation oscillation curve
AttALT	Gain oscillation curve
StairDn	Stair-down waveform
StairUD	Stair-up and stair-down waveform
StairUp	Stair-up waveform
Besselj	Besselj function
Bessely	Bessely function
Sinc	Sinc function

6. Communication with PC

The oscilloscope supports communications with a PC through USB. You can use the Oscilloscope communication software to store, analyze, display the data and remote control.

To learn about how to operate the software. Please download the oscilloscope communication software on our official download website and view it.

Here is how to connect with PC. Please download the Oscilloscope software package from our official website onto your computer, double-click it, and follow the prompts until the installation is complete.

- (1) **Connection:** Use a USB data cable to connect the **USB Device port** in the right panel of the Oscilloscope to the USB port of a PC.
- (2) **USB Port Settings:** The USB protocol type of the oscilloscope needs to be switched to **HID** (Press **System** → **F4**→ **USB**, and switch to **HID**).
- (3) Run the Oscilloscope software after, the connection information in the bottom right corner of the software will turn green.

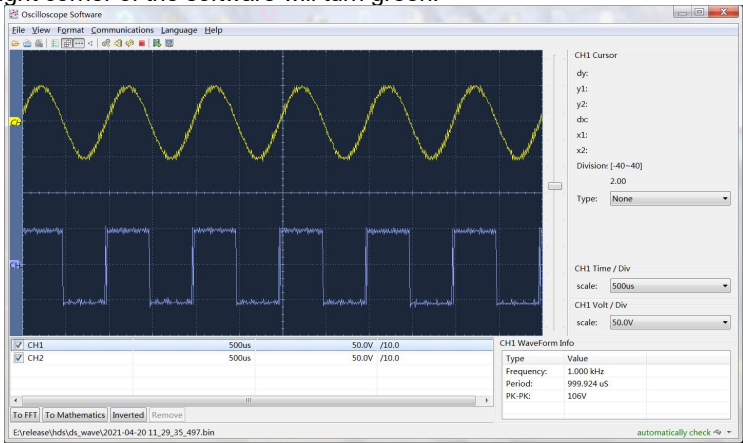


Figure 6- 1 Connect with PC through USB port

7. Troubleshooting

1. The oscilloscope cannot be turned on.

It may be that the battery is completely exhausted. At this time, even if the oscilloscope is powered by the power adapter, the oscilloscope cannot be turned on. You need to charge the battery first, and do not turn on the oscilloscope. Wait for about 15 minutes, and then try to turn on the oscilloscope. If the oscilloscope still cannot be turned on, please contact us to serve you.

2. The oscilloscope turns off after a few seconds of startup.

It may be that the battery is exhausted. Check the battery symbol at the top left of the screen.  symbol indicates that the battery is exhausted and must be charged.

3. After switching to the multimeter, the measurement type is displayed as E.

It may be that the measurement type was not selected. At this time, press **F4**, the measurement type should display the corresponding measurement type. If E is still displayed, restart the oscilloscope.

4. In the oscilloscope state, the measured voltage amplitude value is 10 times larger or smaller than the actual value.

Check whether the channel attenuation coefficient is consistent with the actual probe error ratio.

5. In the oscilloscope state, there is a waveform display, but it cannot be stabilized.

- Check whether the source item in the trigger mode menu is consistent with the signal channel actually used.
- Check whether the trigger electrical level has exceeded the waveform range. Only by setting the parameters reasonably, the waveform can be displayed stably.

6. In the oscilloscope state, nothing is displayed after pressing RUN/STOP.

Check whether the trigger mode of the trigger mode menu is normal or single, and the trigger electrical level is out of the waveform range. If so, center the trigger

electrical level or set the trigger mode to automatic. In addition, you can press **Auto** to automatically complete the above settings.

7. In the oscilloscope state, the display speed becomes slower when the average value sampling is set in the acquisition mode or the duration is set longer in the display settings.

It is normal.

8. Technical Specifications

Unless otherwise stated, all technical specifications are applicable to the probe with the attenuation switch set to 10X and this series of oscilloscopes. The oscilloscope must first meet the following two conditions to meet these specifications and standards:

- The instrument must be operated continuously for more than 30 minutes at the specified operating temperature.
- If the operating temperature variation range reaches or exceeds 5°C, the system function menu must be opened to execute the "automatic correction" program (see automatic correction in "System Settings" on P64).

All specifications are guaranteed except those marked "typical".

Oscilloscope

Characteristic s	Description						
	Model	UT82A	UT82B	UT82C	UT82D	UT82E	UT82F
Bandwidth		50 MHz	50 MHz	100 MHz	100 MHz	200 MHz	200 MHz
Vertical resolution		8 bit					
Channel		2 Analog channel	2 Analog channel + 1 Signal generat or channel	2 Analog channel	2 Analog channel + 1 Signal generat or channel	2 Analog channel	2 Analog channel + 1 Signal generat or channel
Sampling	Sampling method	Sampling, peak detection					
	Real-time sampling rate	250 MSa/s (Single channel)	250 MSa/s (Single channel)	500 MSa/s	500 MSa/s	1GSa/s	1GSa/s
	Waveform refresh rate	10,000 wfms/s					
Input	Input coupling	DC, AC, Ground					

	Input impedance (DC coupling)	1 M Ω ±2%, in parallel with 16 pF±10 pF					
	Probe attenuation	1X 、 10X、 100X、 1000X 、 10000X					
	Maximum input voltage	400 V (DC + AC ,PK - PK)					
	Bandwidth limit	20 MHz ,Full bandwidth					
Horizontal	Sampling rate range	0.25Sa/s ~250 MSa/s	0.25Sa/s ~250 MSa/s	0.25Sa/s ~500 MSa/s	0.25Sa/s ~500 MSa/s	0.25Sa/s ~1GSa/s	0.25Sa/s ~1GSa/s
	Waveform interpolation	(Sinx)/x					
	Sweep speed range (S/div)	5ns/div -1000 s/div, Stepping in the 1-2-5 way	5ns/div- 1000 s/div, Stepping in the 1-2-5 way	2ns/div - 1000s/div, Stepping in the 1-2-5 way	2ns/div - 1000s/div, Stepping in the 1-2-5 way	1ns/div - 1000 s/div, Stepping in the 1-2-5 way	1ns/div - 1000 s/div, Stepping in the 1-2-5 way
	Time base accuracy	±100ppm					
	Record length	8K or 4K optional					
Vertical	Sensitivity (Volt/div) range	10 mV/div~10 V/div					
	Displacement range	±6 div		±2 V (10 mV/div – 200 mV/div); ±100 V (500 mV/div – 10V/div)			
	Analog bandwidth	50 MHz	50 MHz	100 MHz	100 MHz	200MHz	200MHz
	Single bandwidth	≥10 Hz					

	Low frequency response (AC coupling,-3dB)	≤ 7 ns	≤ 7 ns	≤ 3.5 ns	≤ 3.5 ns	≤1.75ns	≤1.75ns
	Rise time (typical on BNC)	±3%					
Measurement	Cursor	ΔV, ΔT					
	Automatic	Period, Frequency, Mean, PK-PK, Max, Min, Amplitude,RMS,Rise Time,Fall Time,				Period, Frequency, Mean, PK-PK, Max, Min, Amplitude, RMS,Rise Time,Fall Time, +PulseWidth, -PulseWidth	
Triggering	Source	CH1, CH2					
	Type	Edge					
	Coupling	DC, AC					
	Trigger type	Auto, normal, single					
	Trigger electrical level range	±4 div from the center of the screen					
	Trigger electrical level accuracy	±0.3 div					
	Trigger displacement	According to Record length and time base					
	Edge triggering	Rising edge, falling edge					

The output of the probe compensator:

Characteristics	Description
Output voltage (typical)	Approx. 3.3Vpp, High-Z
Frequency (typical)	Square wave 1 kHz ($\pm 1\%$)

Multimeter

Characteristics		Description	
Digital display		24000 readings	
Measurement type		Voltage, current, resistance, capacitance, on/off, diode	
Maximum Input voltage		AC : 750V DC : 1000V	
Maximum Input current		AC : 10A DC : 10A	
Basic function	Range	Minimum resolution	Accuracy
DC voltage	240.00mV	0.01mV	±(0.3%+10dig)
	2.4000V	0.1mV	±(0.3%+5dig)
	24.000V	1mV	
	240.00V	0.01V	
	1000.0V	0.1V	
AC voltage ^[1]	240.00mV	0.01mV	±(0.8%+10dig)
	2.4000V	0.1mV	
	24.000V	1mV	
	240.00V	0.01V	
	750.0V	0.1V	±(1%+10dig)
Frequency range: 40Hz-1000Hz			
DC current	240.00mA	0.01mA	±(0.8%+10dig)
	10.000A	1mA	±(2.5%+10dig)
	Overload protection: mA function:self-healing fuse 400mA/250V;Ampere function:10A/600V, D5.2*20, fast-acting fuse		
AC current ^[1]	240.00mA	0.01mA	±(1%+10dig)
	10.000A	1mA	±(2.8%+10dig)
	Frequency range: 40Hz-1000Hz		
Overload protection: mA function: self-healing fuse 400 mA/250 V; Ampere function: 10A/600 V, D5.2* 20, fast-acting fuse			

Resistance	240.00Ω	0.01Ω	±(0.8%+10dig)
	2.4000kΩ	0.1Ω	±(0.8%+5dig)
	24.000kΩ	1Ω	±(0.8%+3dig)
	240.00kΩ	10Ω	
	2.4000MΩ	0.1kΩ	
	24.000MΩ	1kΩ	±(1%+3dig)
	100.00MΩ	0.01MΩ	±(5%+10dig)
Capacitance [1]	20.000nF	1pF	±(3.0%+10dig)
	200.00nF	10pF	
	2.0000μF	0.1nF	
	20.000μF	1nF	
	200.00μF	10nF	
	2.0000mF	0.1uF	
Others	On/Off test	√ (<50Ω)	
	Diode test	√(Approx.3V)	
	Auto range	√	
	TRMS	√	

[1] When measuring AC voltage/current or capacitance, accuracy guarantee range is 5% to 100% of the range.

Arbitrary Waveform Generator(Only UT82B/UT82D/UT82F)

Characteristics	Description	
Waveform Frequency	Sine	0.1Hz~30MHz
	Square	0.1Hz~5MHz
	Ramp	0.1Hz~1MHz
	Pulse	0.1Hz~5MHz
	Arbitrary	0.1Hz~5MHz
Sampling	125MSa/s	
Amplitude(50Ω)	0.01Vpp ~ 2.5Vpp	
DC offset(High Z)	±(2.5V – Amplitude Vpp/2)	
Frequency Resolution	0.0001	

Channel	1
Waveform Depth	8k
Vertical Resolution	14 bit
Output Impedance	50 Ω

General Technical Specifications

Display

Characteristics	Description
Display type	3.5-inch color LCD display
Display resolution	320 horizontal $\times$ 240 vertical pixels
Display color	65536 colors

Power supply

Power supply	100 - 240 VACRMS, 50/60 Hz, CAT II
	DC INPUT: 5VDC, 2A
Power consumption	UT82A/UT82B: <5 W UT82C/UT82D/UT82E/UT82F: <10W
Battery	2600mAh*2 (18650)

Surroundings

Temperature	Working temperature: 0°C - 40°C Storage temperature: -20°C- +60°C
	$\leq 90\%$
Relative humidity	Operating: 3,000 meters Non-operating: 15,000 meters
Height	Natural cooling
	Working temperature: 0°C - 40°C Storage temperature: -20°C- +60°C
Cooling method	$\leq 90\%$

Mechanical specifications

Dimensions	198 mm (length) × 96mm (height) × 38 mm (width)
Weight	About 0.6 kg (main unit, without battery)

9. Appendix

Appendix A: List of Accessories

Name	Number	Description
Machine	1	
Power adapter	1	
USB Cable	1	
Passive probes	2	
Crocodile clip cable	1	Only UT82B/UT82D/UT82F
Multimeter probes	1	One red and one black
User Manual	1	
Warranty、certificate	1	

Appendix B: Maintenance and Cleaning

General maintenance

Do not store or place the instrument in a place where the LCD screen will be exposed to direct sunlight for a long time.

Caution: Do not let spray, liquid or solvent touch the instrument or probe to prevent damage to the instrument or probe.

Cleaning:

Check the instrument and probe frequently according to the operation. Clean the external surface of the instrument as follows:

1. Please wipe the floating dust outside the instrument and probe with a soft cloth. When cleaning the LCD, be careful not to scratch the transparent LCD protection screen.

2. Wipe the instrument with a damp but non dripping soft cloth. Please disconnect the power supply. It can be scrubbed with soft detergent or water. Do not use any abrasive chemical cleaning agent to avoid damaging the instrument or probe.



Warning: Please make sure the instrument is dry before re-energizing to avoid electrical short circuit or personal injury caused by moisture.

Charging and Replacement of Battery

During the long-term storage of the device, the battery may be too low due to the self-discharge of the lithium battery and the device cannot be turned on. This is a normal phenomenon.

Please use the attached adapter to pre-charge the device for 0.5 to 1 hour (depending on the storage time) before turning it on. In addition, if the device is not used for a long time, it is recommended to charge it at regular intervals to avoid over-discharge of the lithium battery.

Battery Charging

The lithium battery may not be fully charged when delivered. To make the battery be charged, refer to the following table to charge and discharge:

Model	Charging	Discharging
UT82A UT82B	Approx. ≥ 4.5 h	Approx. ≥ 4 h
UT82C UT82D	Approx. ≥ 4 h	Approx. ≤ 3 h
UT82E UT82F	Approx. ≥ 4.5 h	Approx. ≤ 1.5 h

The power supply and battery indicator symbols in the upper right corner of the screen are explained as follows:



symbol indicates the power-on charging status;



symbol indicates battery power supply;



symbol indicates that there is only about five minutes of use time left. Please charge as soon as possible according to the relevant tips to avoid damage to the battery.

Charging Method

Charging the battery through the power adapter: Connect the oscilloscope to the power socket through the USB data cable and power adapter delivered with the machine for charging.

Charge the oscilloscope through the USB interface: Connect the oscilloscope to a computer or other equipment through a USB data cable for charging (pay attention to the load capacity of the power supply equipment to avoid abnormal operation of the equipment).

Note

To avoid overheating of the battery during charging, the ambient temperature must not exceed the allowable value given in the technical specifications.

Replacement of Lithium Battery

Generally, the battery does not need to be replaced. However, when necessary, it can only be replaced by qualified personnel, and only **lithium batteries of the same specification** can be used.



优利德®

优利德科技(中国)股份有限公司

地址：广东省东莞市松山湖园区工业北一路6号

电话：(86-769) 8572 3888

邮编：523 808

<http://www.uni-trend.com.cn>